PATENT ABSTRACTS OF JAPAN

(11)Publication number : 05-316369

(43)Date of publication of application : 26.11.1993

(51)Int.Cl. H04N 1/41
G06F 15/66
H04N 7/133

(21)Application number : 04-122077

(22)Date of filing : 14.05.1992

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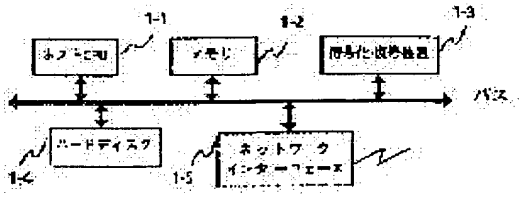
(54) PICTURE COMPRESSION/EXPANSION DEVICE

(57)Abstract:

PURPOSE: To realize the compression/expansion device for a picture in which plural algorithms are selected depending on application and operated at a high speed.

CONSTITUTION: A host CPU 1-1 controlling the entire device generates or decodes control information for compression or expansion processing, selects a proper program from a program for plural picture processing units stored on a hard disk 1-4 and transfers the program to a coding and decoding device 1-3. The coding and decoding device 1-3 down-loads the program and runs the program. Then the host CPU 1-1 extracts a picture or compressed data from the hard disk 1-4 and transfers it to a coding decoding device 1-3 sequentially. The coding decoding device 1-3 processes data sent according to the preceding program. Then the host CPU 1-1 extract sequentially the data processed by the coding decoding device 1-3 and outputs it to the hard disk 1-4.



LEGAL STATUS

[Date of request for examination]	16.12.1998
[Date of sending the examiner's decision of rejection]	08.09.2000
[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]	
[Date of final disposal for application]	
[Patent number]	
[Date of registration]	
[Number of appeal against examiner's decision of rejection]	
[Date of requesting appeal against examiner's decision of rejection]	
[Date of extinction of right]	

* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1] The control means which processes creation/interpretation of the control information added to control of the whole picture compression elongation equipment and the position in the compressed data based on this, A storage means to memorize temporarily the data which said control means uses, and an image-processing means to perform the image processing which is needed compression elongation and before and after that, A secondary memory means to keep the control program of processed data or said image-processing means, It has the 1st data-exchange means for said control means and said image-processing means to perform the data exchange and the 2nd data-exchange means. After reading said control program from said secondary memory means and downloading for said image-processing means through said 1st data-exchange means, Picture compression elongation equipment characterized by performing compression elongation processing and the order processing in said image-processing means while exchanging compressed data for asynchronous for image data with the 2nd data-exchange means with the 1st data-exchange means according to a demand of said image-processing means.
[Claim 2] Picture compression elongation equipment according to claim 1 characterized by processing creation/interpretation of said control information by said control means, and making color transform processing, infanticide processing, compression processing or elongation processing, interpolation processing, and color transform processing carry out to said image-processing means.
[Claim 3] a control program suitable based on said two or more control programs stored in said secondary memory means to said control information after processing creation/interpretation of said control information -- choosing -- said image-processing means -- downloading -- compression elongation processing and the order place Michiyuki ****** -- the picture compression elongation equipment according to claim 1 characterized by things.
[Claim 4] Picture compression elongation equipment according to claim 1 which has the big storage means of capacity in said 1st data-exchange means, and is further characterized [a storage means smaller than said 1st data-exchange means] for **** by things at said 2nd data-exchange means.

[Translation done.]

* NOTICES *

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the compression elongation equipment of a picture signal.
[0002]
[Description of the Prior Art] Since two or more algorithms exist in picture compression elongation processing and it generally has the advantage and demerit, it is used based on image quality / compressibility / output media, choosing a suitable thing (for example, an interface, Dec.1991, P129 - 231 reference). For example, when it is more desirable to encode with the algorithm which can perform grasp of the whole image in an instant in retrieval of image data and it outputs image data to a printer etc., to encode with the algorithm which can be processed by little memory is desired. Or even if irreversible, an algorithm which realizes high-pressure shrinking percentage may be desired, and reversibility may be desired also with low voltage shrinking percentage. Thus, since the algorithms needed according to a situation differ, as for picture compression elongation equipment, it is desirable to mount two or more algorithms. Moreover, since a color picture is treated, rapidity is needed for processing the huge amount of data.
[0003] If the above demand is realized by the general-purpose processor, it can respond to two or more algorithms, but since there is much amount of data to treat, compression elongation processing takes time amount very much (for example, Nikkei EREKUROTONIKUSU, 1991.6.24, P149 - 158 reference).

[0004] On the other hand, high-speed processing becomes possible by using LSI only for compression elongation (for example, image information, 1991.6, P35 -41 reference).
[0005] Drawing 8 shows the example of an outline configuration of the conventional coding / decode equipment which used Dedication LSI. This coding / decode equipment is equipped with only for [LSI / 3-1] coding / decode, the memory 3-2 for the data exchanges, 3-3, the memory 3-4 for tables, and a bus interface 3-5.
[0006] Into dedication LSI 3-1, coding and decoder-circuit 3-1a of a Huffman-coding method, DCT (discrete cosine transform) conversion circuit 3-1b, quantization circuit 3-1c, a three to 1 d quantization table, bus interface 3-1e, three to 1 f, etc. are prepared, and coding / decode method used according to a demand of a user is switched. However, it is only mounting the circuit corresponding to a part of algorithm (their being a Huffman-coding method and a DCT method at the example of drawing 8) existing [two or more] only for [LSI] the above. Moreover, since the circumference components of memory 3-2, 3-3, and 3-4 grade other than dedication LSI 3-1 are needed when using some kinds of dedication LSI, the problem on mounting of area, power consumption, etc. arises.
[0007]
[Problem(s) to be Solved by the Invention] Then, this invention changes two or more algorithms according to an application, and aims at realizing economically the compression elongation equipment of the image which moreover operates at high speed.

[0008]
[Means for Solving the Problem] The control means which processes creation/interpretation of the control information added to control of the whole picture compression elongation equipment and the position in the compressed data based on this in order that the picture compression elongation equipment of this invention may attain said purpose, A storage means to memorize temporarily the data which said control means uses, and an image-processing means to perform the image processing which is needed compression elongation and before and after that, A secondary memory means to keep the control program of processed data or said image-processing means, It has the 1st data-exchange means for said control means and said image-processing means to perform the data exchange and the 2nd data-exchange means. After reading said control program from said secondary memory means and downloading for said image-processing means through said 1st data-exchange means, It is characterized by performing compression elongation processing and the order processing in said image-processing means, exchanging compressed data for asynchronous for image data with the 2nd data-exchange means with the 1st data-exchange means according to a demand of said image-processing means.
[0009]
[Function] The control means which manages control of the whole equipment generates or interprets the control information for compression or elongation processing, chooses a suitable program from two or more programs for image processing systems saved for the secondary memory means, and transmits it to an image-processing means to perform coding and decode. Then, an image-processing means downloads and runs it. Next, a control means takes out an image or code data from a secondary memory means etc., and transmits it to an image-processing means one by one. An image-processing means processes the data sent according to the previous program. And a control means takes out the data processed with the image-processing means one by one, and outputs them to a secondary memory means etc.
[0010]
[Example] Hereafter, based on an example, the description of this invention is explained concretely, referring to a drawing.
[0011] Drawing 1 shows the outline configuration of the picture compression elongation equipment for carrying out this invention. This picture compression elongation equipment Control of the whole picture compression elongation equipment, The host CPU which is a control means for carrying out creation/interpretation of the control information (it mentions later for details) added to compressed data based on this (central processing unit) The memory 1-2, the compression elongation, and the image processing which are a storage means to memorize temporarily the data which 1-1 and said control means use Coding / decode equipment 1-3 for carrying out, and picture compression elongation equipment It connects with a network. I/O of the data The network interface 1-5 which is an I/O means for carrying out, It consists of a hard disk 1-4 which is a mass secondary memory means to keep image data, the code data which added said control information to said compressed data, the program which operates on said coding / decode equipment 1-3.
[0012] As said coding / decode equipment 1-3 is shown in drawing 2 Compression elongation processing and an image processing required before and after that The image processing system 2-4 which is the image-processing means to perform, The general-purpose memory 2-1 which is one of the data-exchange means which performs the data exchange between said host CPUs 1-1 and said image processing systems 2-4, and is the 1st data-exchange means for performing the data exchanges, such as image data and a program for said image processing systems 2-4, Similarly by one of the data-exchange means, exchange of compressed data It consists of the sign memory 2-2 which is the 2nd data-exchange means for carrying out, the work-piece memory 2-5 of said image processing system 2-4, a DCT unit 2-3 which performs DCT conversion, and a program ROM 2-6 in which the program for starting of said image processing system 2-4 is stored.
[0013] First, fundamental actuation of above-mentioned picture compression elongation equipment is explained.
[0014] The host CPU 1-1 generates or interprets the control information for compression or elongation processing. Then, the host CPU 1-1 chooses a suitable program from two or more programs for image

processing systems 2-4 saved at the hard disk 1-4, and transmits it to coding / decode equipment 1-3. Then, it is already started from a program ROM 2-6, and the image processing system 2 -4 of the waiting for program data downloads and runs it. Next, the host CPU 1-1 takes out an image or compressed data from a hard disk 1-4 or a network interface 1-5, and transmits it to sequential coding / decode equipment 1-3. The image processing system 2-4 on coding / decode equipment 1 -3 processes the data sent according to the previous program. And the host CPU 1-1 takes out the data processed with the image processing system 2-4 one by one, and outputs them to a hard disk 1 -4 or a network interface 1-5.

[0015] The process in which compression processing is performed using the DCT conversion which is one of the orthogonal transformation is explained with reference to the flow chart of drawing 3 and drawing 4 , and code data structural drawing of drawing 5 . In addition, in the flow chart of drawing 4 , the frame of a continuous line shows processing of the host CPU 1 -1 which is a general-purpose processor, and the frame of a broken line shows processing of the image processing system 2-4 which is an image processing processor. The same is said of the flow chart of drawing 6 mentioned later. In addition, it is assumed that the quantization table Huffman table used in case compression processing is performed is called for in advance, or a default table is used for it.

[0016] First, an image processing system 2-4 loads a bootstrap from a program ROM 2-6 by power-source ON (S11), as shown in drawing 3 (S12). An image processing system 2 -4 moves control to a bootstrap, after loading a bootstrap. An image processing system 2 -4 waits to send the program of compression or elongation processing from the host CPU 1-1, after initializing the inside of coding / decode equipment 1-3 according to the program (S13) (S14).

[0017] On the other hand, the host CPU 1 -1 will generate the control code 5-1 and 5-3a which show the initiation shown in drawing 5 , and termination, and header information 5 -2 and 5-3b based on this information, if a parameter required for compression processing is received with directions of the existence of the compression processing using DCT conversion, and pretreatment as shown in drawing 4 (S21). In this example, the code data has the structure where two or more compressed data 5-3c was arranged after header 5-3b. For example, it is expressed with three code data which the data 1 corresponding to three color components from which the image of one sheet differs, respectively, data 2, and data 3 follow when the color picture is decomposed into three color components. For example, data 1 show the code data in a specific color space, and consist of start data 5-3a which shows initiation of the code data of a specific color space, header 5-3b, compressed data 5-3c which is the code data body of a specific color space. The host CPU 1-1 chooses and reads the program of the image processing system 2-4 required for processing from two or more programs stored in the hard disk 1 -4 based on a previous parameter or header information. And it transmits to the general-purpose memory 2-1 on coding / decode equipment 1-3 (S22).

[0018] The waiting image processing system 2-4 loads the program transmitted to the general -purpose memory 2-1 to the interior, and runs the program for compression (S23).

[0019] The host CPU 1-1 transmits a complement child-ized table Huffman table to compression to the general-purpose memory 2-1 of coding / decode equipment 1-3 (S24). An image processing system 2-4 stores the data in the two to image processing system 4 interior. If color conversion, subsampling, etc. need to be pretreated at this time, the host CPU 1-1 will be notified to an image processing system 2-4. Next, the host CPU 1-1 reads a part of image data from a hard disk 1 -4 or a network interface 1-5 (S25), and transmits it to the general-purpose memory 2-1 (S26).

[0020] To the sent image data, if an image processing system 2 -4 needs to be pretreated (color conversion, subsampling), it carries out the processing to expansion of middle data using the work -piece memory 2-5 (S27-S30). Furthermore, while an image processing system 2 -4 carries out pixel train conversion of the data at the block of 8x8, it transmits to the DCT unit 2 -3 in order of a block (S31). In the DCT unit 2-3, DCT conversion is performed to the sent block (S32). And an image processing system 2-4 reads the multiplier data changed in the DCT unit 2 -3. And zigzag scan and quantization processing are performed using the work -piece memory 2-5 (S33). Finally, an image processing system 2-4 writes compressed data in the sign memory 2-2, performing Huffman coding processing for the quantized multiplier (S35). (S34)

[0021] The host CPU 1-1 reads the compressed data on the sign memory 2-2, if it is required, it adds it with a gestalt as shows the header information searched for previously to drawing 5 , and it is outputted to a hard disk 1-4 or a network interface 1-5 (S36).
[0022] The above and processing from a data input to data output are repeated until image data is completed (S37).
[0023] The above processing can perform compression processing of image data.
[0024] Next, the elongation processing which elongates the image data compressed by above-mentioned processing is explained with reference to the flow chart of drawing 6 .
[0025] The host CPU 1-1 will interpret the control code 5-1 and header information 5-2 which are shown in drawing 5 based on this information, if a parameter required for elongation processing is received with directions of the existence of elongation processing and after treatment which used DCT conversion (S41). And the correspondence program of the image processing system 2-4 required for processing is chosen and read from two or more programs stored in the hard disk 1-4 based on this information. And it transmits to the general-purpose memory 2-1 on coding / decode equipment 1-3 (S42).
[0026] The waiting image processing system 2-4 loads the program transmitted to the general-purpose memory 2-1 to the interior, and runs the program for elongation (S43).
[0027] The host CPU 1-1 transmits a complement child-ized table Huffman table to elongation to the general-purpose memory 2-1 of coding / decode equipment 1-3 (S44). An image processing system 2-4 stores the data in the two to image processing system 4 interior.
[0028] Next, after the host CPU 1-1 reads a part of code data from a hard disk 1-4 or a network interface 1-5 and extracts header information etc. (S45), it is transmitted to the general-purpose memory 2-1 (S46).
[0029] An image processing system 2-4 reproduces the Huffman decode (S47) of compressed data 5-3c, reverse quantization (S48), and reverse DCT conversion (S49) to image data per block, and it writes them out to the general-purpose memory 2-1, returning the data of the order of a block in order of the data of normal (S50).
[0030] When pretreatment of color conversion, subsampling, etc. is performed in the case of compression processing, interpolation and color conversion are performed corresponding to this (S51 - S54).
[0031] The host CPU 1-1 transmits image data to memory (S55), and outputs it to a hard disk 1-4 or a network interface 1-5 (S56).
[0032] The above and processing from a data input to data output are repeated until compressed data is completed (S57).
[0033] The above processing can perform elongation processing of code data.
[0034] In above-mentioned explanation, although the quantization table Huffman table is called for in advance, or assumes that a default table is used and is carrying out, it is transforming the compression processing flow which explained by drawing 4 , and can create the optimal Huffman table easily. Hereafter, the procedure which creates this optimal Huffman table is explained with reference to the flow chart of drawing 7 .
[0035] After performing quantization processing (S33) of the compression processing flow shown in drawing 4 , the host CPU 1-1 takes out quantization data by the processing screen through the general-purpose memory 2-1 (S61). The frequency of occurrence of each quantization data is then counted (S62). The host CPU 1-1 generates the Huffman table so that a short sign may be assigned to quantization data with the high frequency of occurrence based on the frequency of occurrence (S63), and it transmits to an image processing system 2-4 through the general-purpose memory 2-1 (S64). The host CPU 1-1 transmits the taken-out quantization data to the general-purpose memory 2-1 again (S65). And an image processing system 2-4 can perform compression processing using the optimal Huffman table by performing Huffman coding processing based on the Huffman table sent previously.
[0036]
[Effect of the Invention] As stated above, two or more control programs of an image processing system

are saved in the hard disk, and compression elongation processing with two or more algorithms is attained by [which realize the specified algorithm] making control program selection, loading it to an image processing system and performing it. In order for not the host CPU but the image processing system only for image processings to perform compression elongation processing and processing [before and after] at this time, it becomes possible to perform the whole processing at a high speed.
[0037] Moreover, since the intermediate result of processing, for example, the result after quantization, can be easily taken out to a host CPU side and creation of the optimal Huffman table can carry out easily, compressibility is efficiently controllable.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram showing the outline configuration of the picture compression elongation equipment with which this invention is applied.
[Drawing 2] It is the block diagram showing the outline of the internal configuration of coding / decode equipment of the picture compression elongation equipment shown in drawing 1 .
[Drawing 3] It is the flow chart which shows the example of starting of an image-processing means.
[Drawing 4] It is the flow chart which shows the compression processing when using picture compression elongation equipment.
[Drawing 5] It is the explanatory view showing the example of code data structure.
[Drawing 6] It is the flow chart which shows the elongation processing when using picture compression elongation equipment.
[Drawing 7] It is the flow chart which shows the example of the Huffman table creation procedure.
[Drawing 8] It is the block diagram showing the example of an outline configuration of the conventional coding / decode equipment using Dedication LSI.
[Description of Notations]
1-1 Host CPU, 1-2 Memory, 1-3 Coding / Decode Equipment, 1-4 hard disk, 1-5 Network interface, 3-1 Only for [LSI] coding / decode, 3-2, 3-3 Memory for the data exchanges, 3-4 The memory for tables, 3-5 I/O bus interface, 2-1 General-purpose memory, 2-2 Sign memory, 2-3 A DCT unit, 2-4 An image processing system, 2-5 Work-piece memory, 2-6 Program ROM, 5-1, 5-3a A control code, 5-2, 5-3b Header information, 5-3 Compressed data

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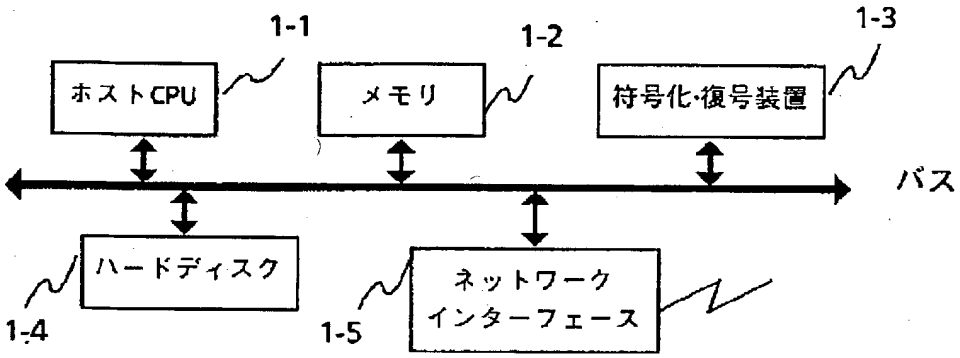
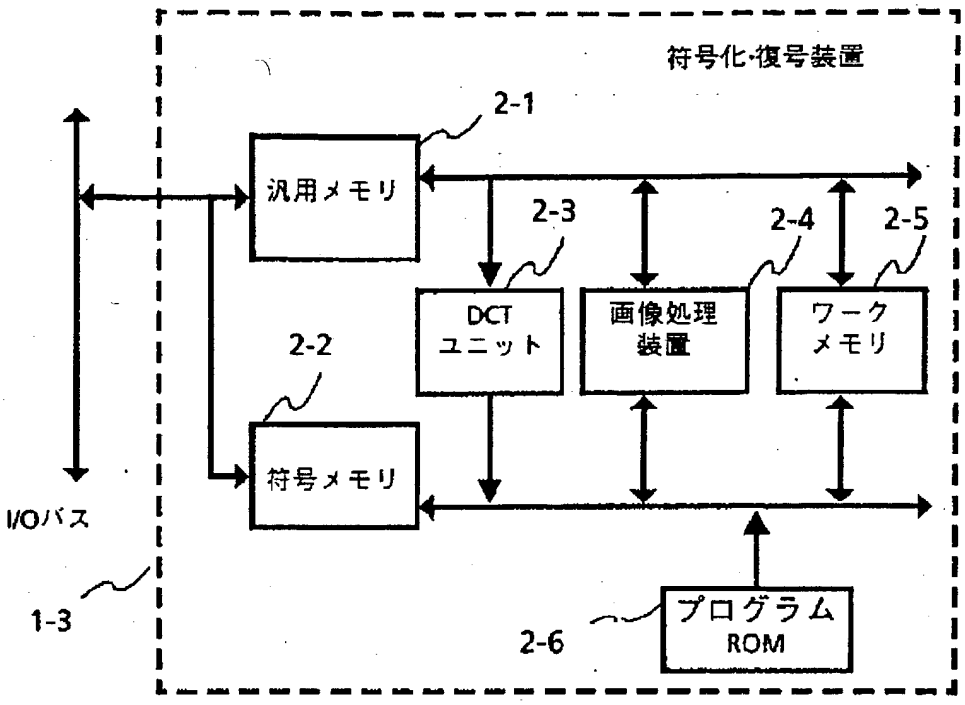
DRAWINGS

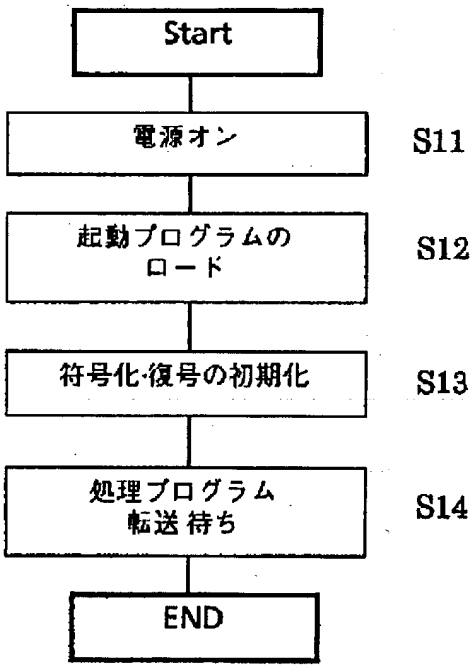
[Drawing 1]



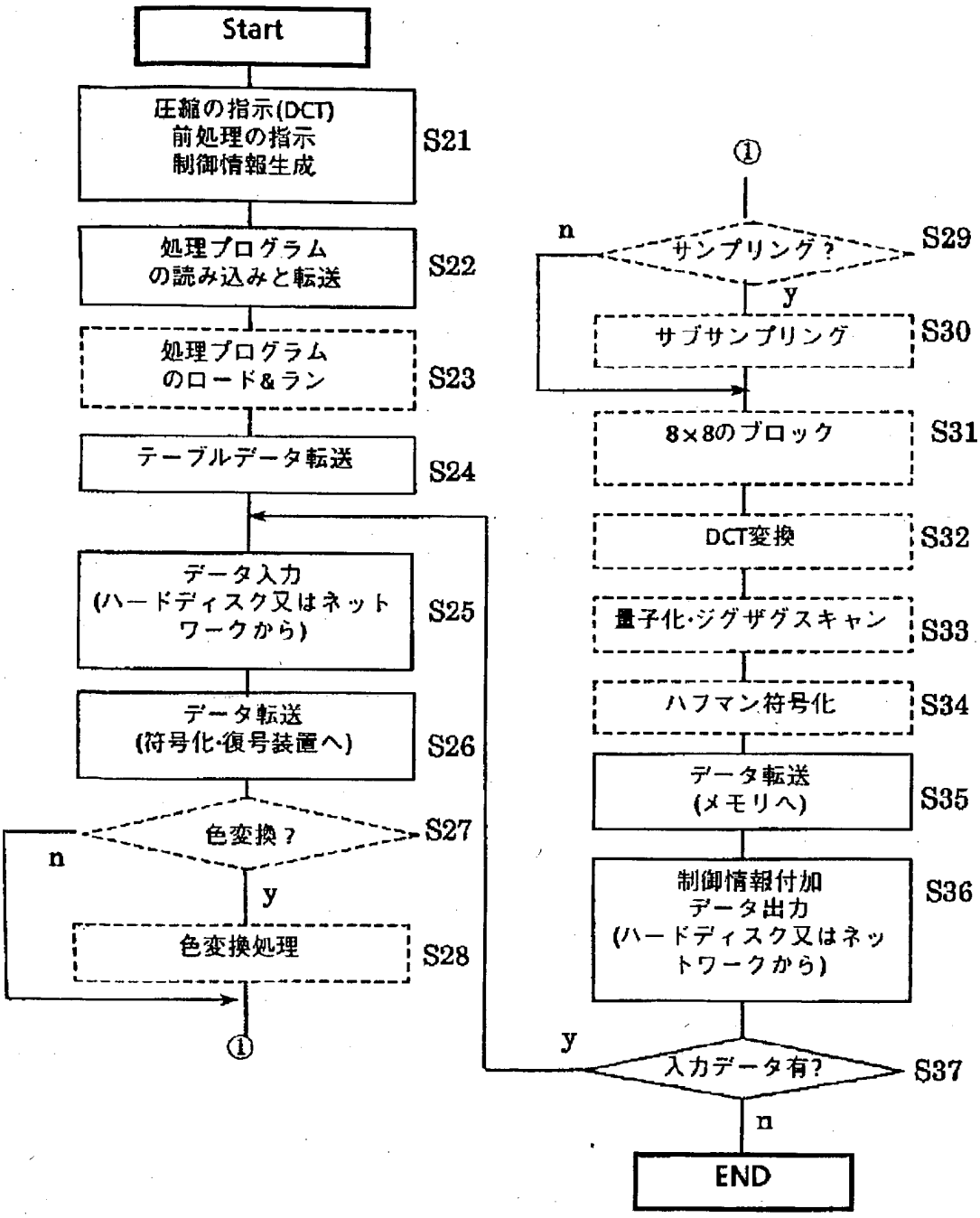
[Drawing 2]



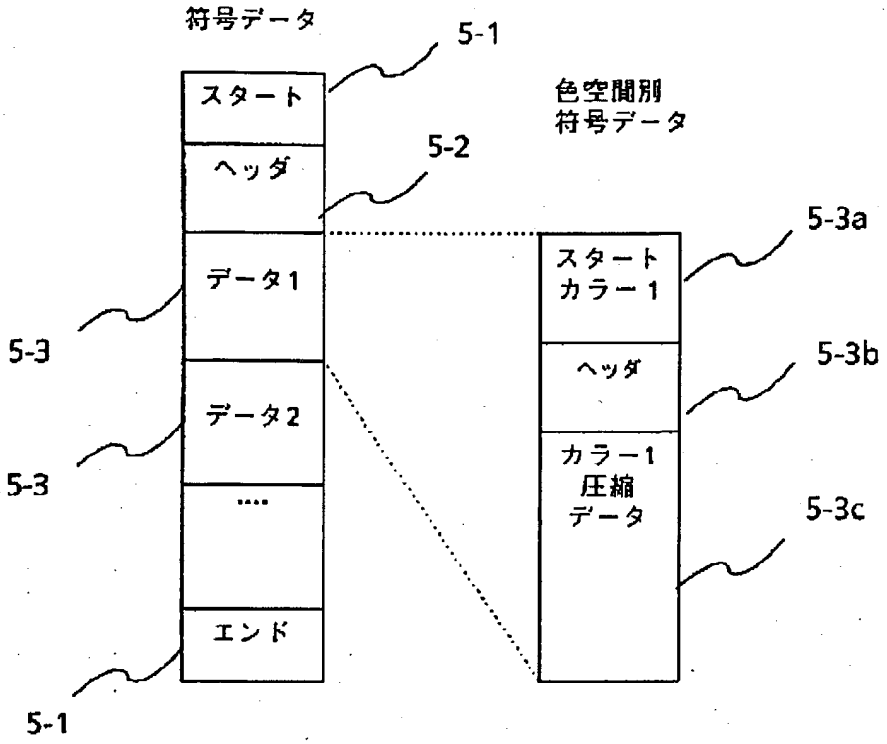
[Drawing 3]



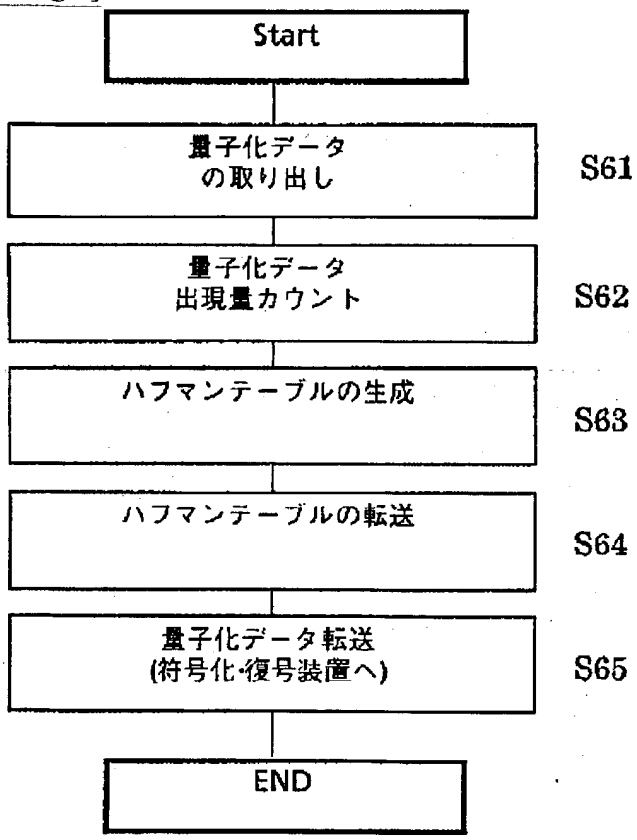
[Drawing 4]


Start
圧縮の指示(DCT)
前処理の指示
制御情報生成
S21
処理プログラム
の読み込みと転送
S22
処理プログラム
のロード&ラン
S23
テーブルデータ転送
S24
データ入力
(ハードディスク又はネット
ワークから)
S25
データ転送
(符号化・復号装置へ)
S26
色変換？
S27
n
y
色変換処理
S28
①
①
n
サンプリング？
S29
y
サブサンプリング
S30
8×8のブロック
S31
DCT変換
S32
量子化・ジグザグスキャン
S33
ハフマン符号化
S34
データ転送
(メモリへ)
S35
制御情報付加
データ出力
(ハードディスク又はネッ
トワークから)
S36
y
入力データ有？
S37
n
END

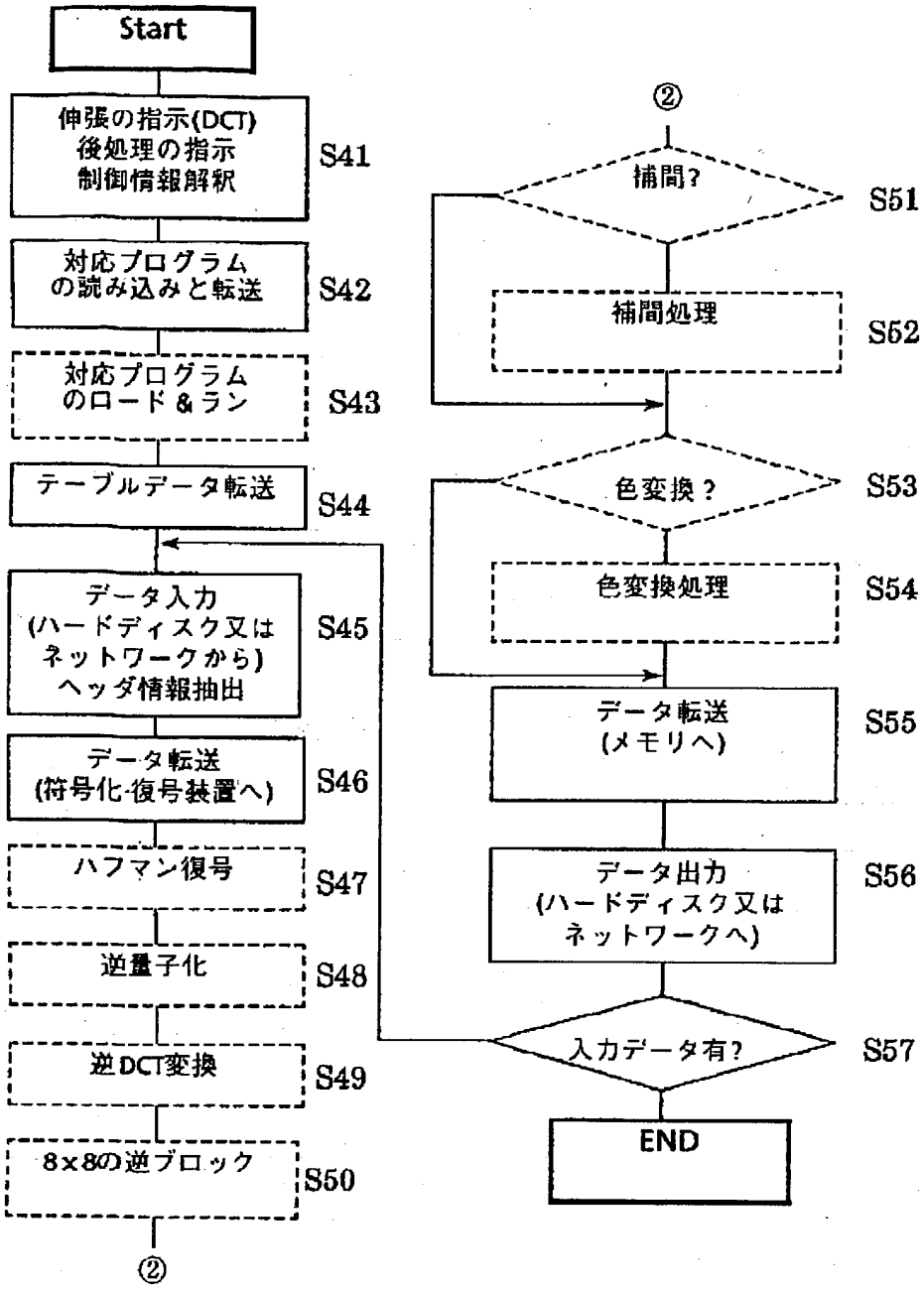
[Drawing 5]



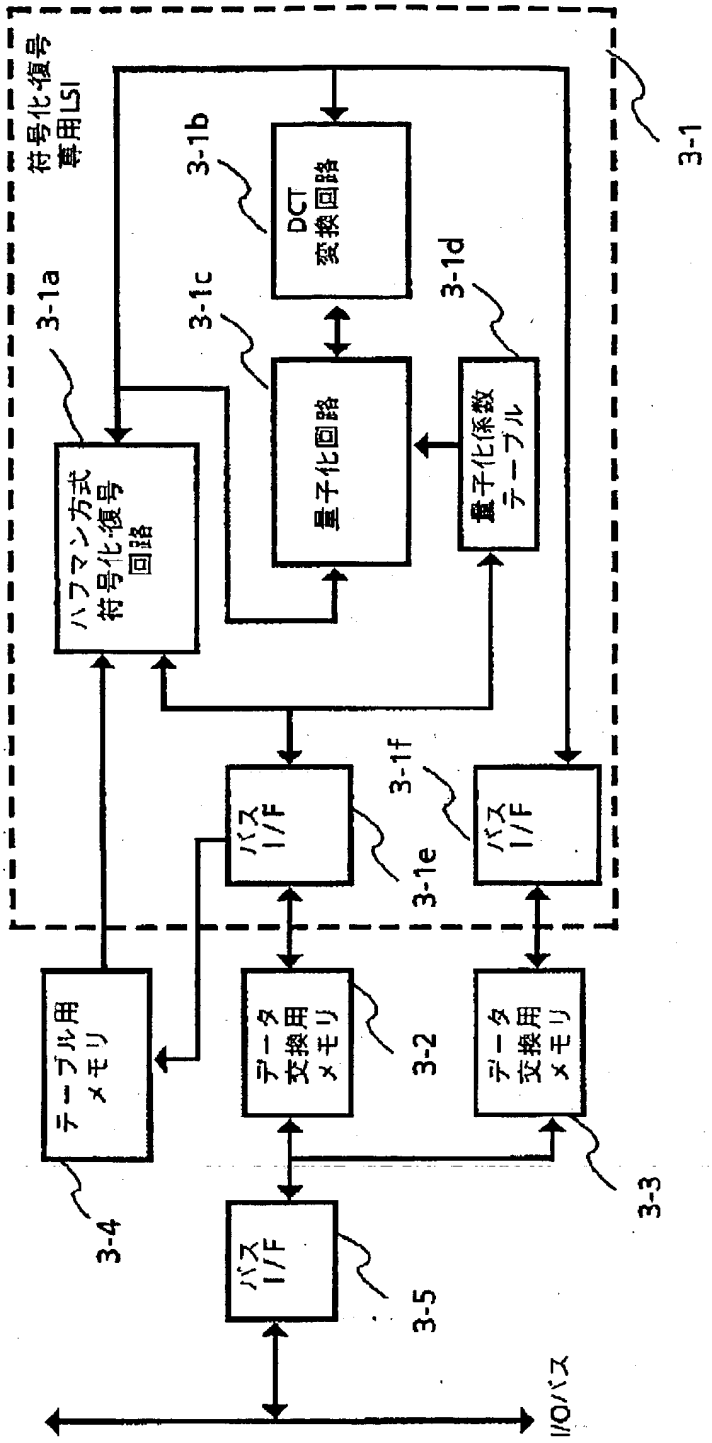
[Drawing 7]



[Drawing 6]


Start
伸張の指示(DCT)
後処理の指示
制御情報解釈
S41
対応プログラム
の読み込みと転送
S42
対応プログラム
のロード&ラン
S43
テーブルデータ転送
S44
データ入力
(ハードディスク又は
ネットワークから)
ヘッダ情報抽出
S45
データ転送
(符号化・復号装置へ)
S46
ハフマン復号
S47
逆量子化
S48
逆DCT変換
S49
8×8の逆ブロック
S50
②
②
補間?
S51
補間処理
S52
色変換?
S53
色変換処理
S54
データ転送
(メモリへ)
S55
データ出力
(ハードディスク又は
ネットワークへ)
S56
入力データ有?
S57
END

[Drawing 8]



[Translation done.]